

# EXHIBIT I

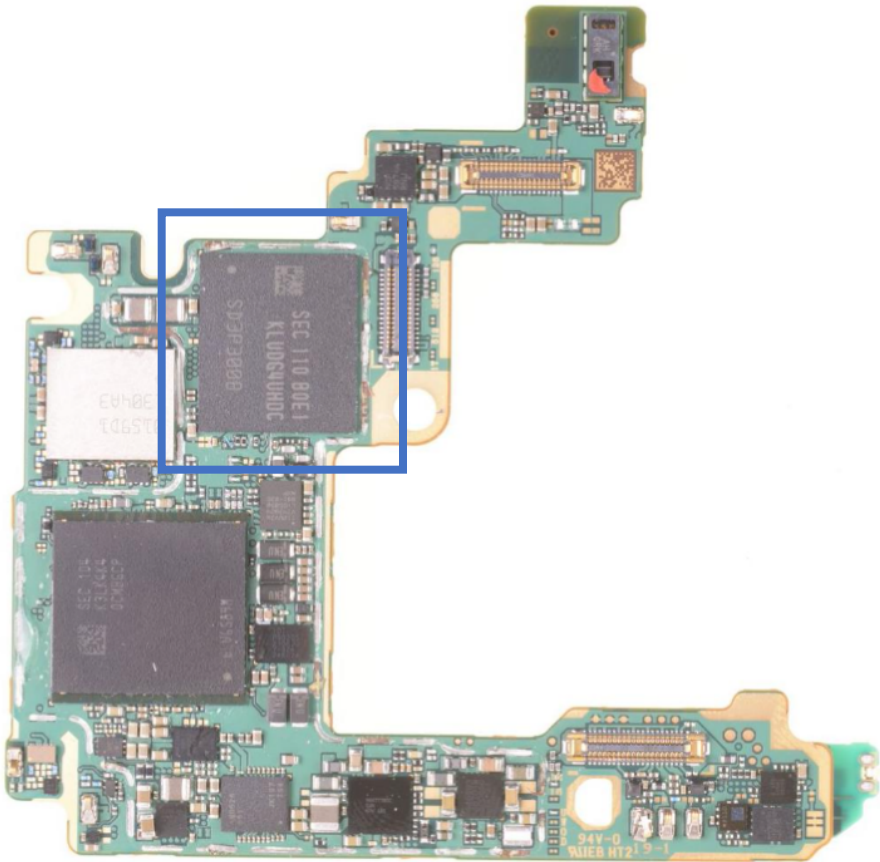
**U.S. Patent No. 6,724,241 (“’241 Patent”)**

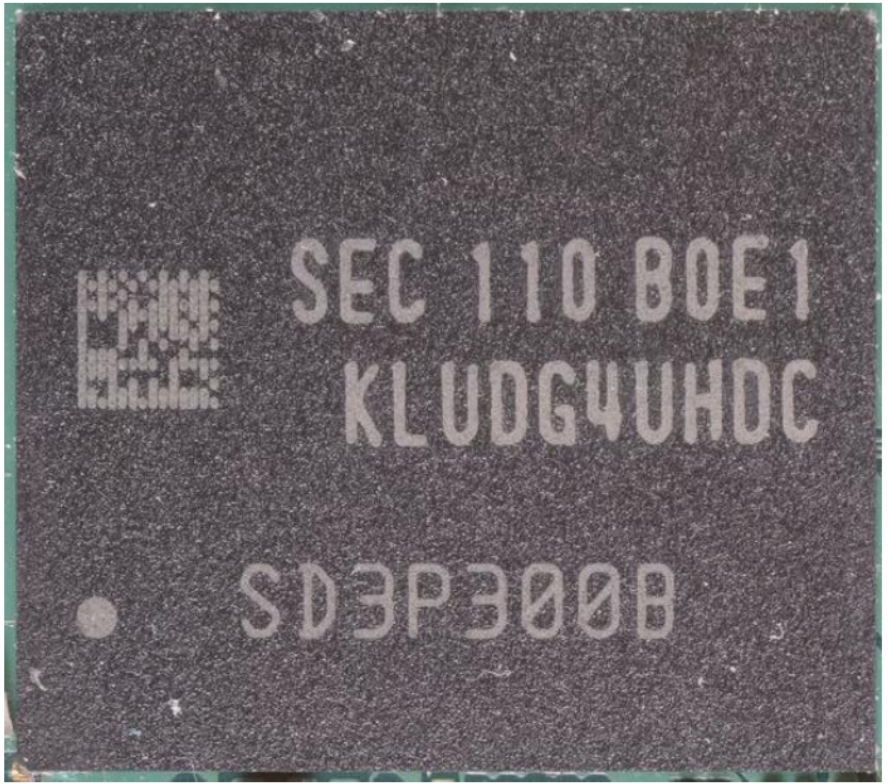
**Accused Products**

Samsung products with Samsung NAND flash chips, including without limitation the Samsung Galaxy S21 Ultra 5G (“Accused Products”), infringe at least Claims 1-3 and 6-8 of the ’241 Patent.

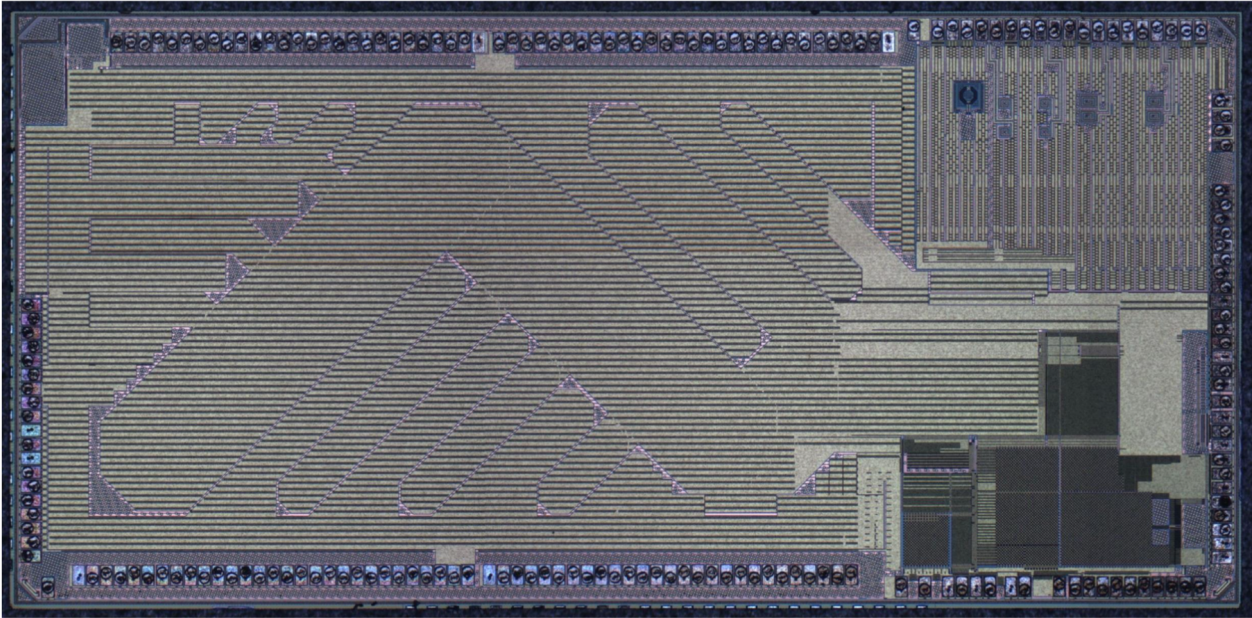
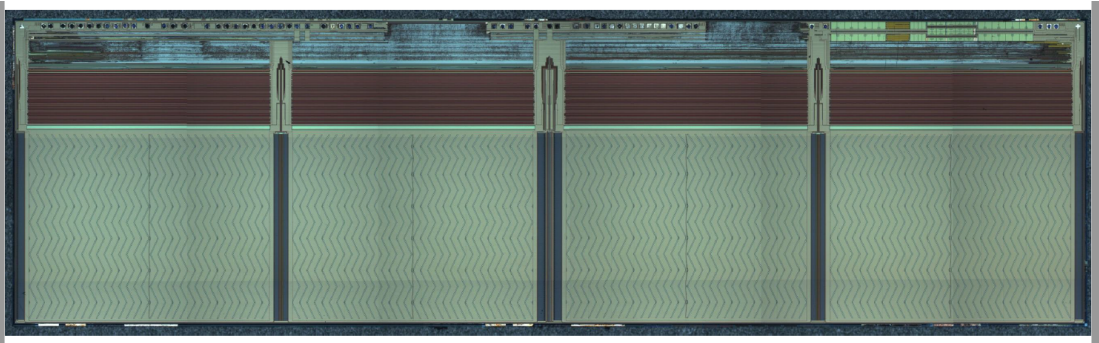
**Claim 1**

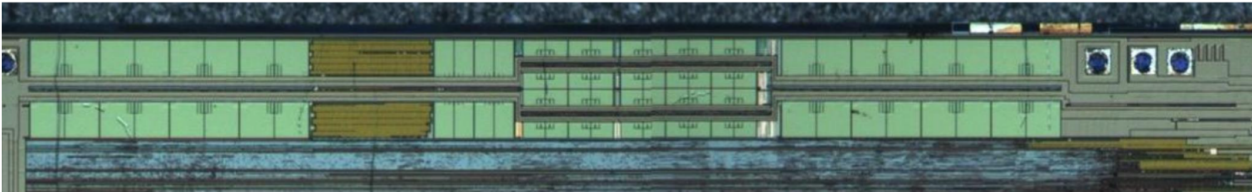
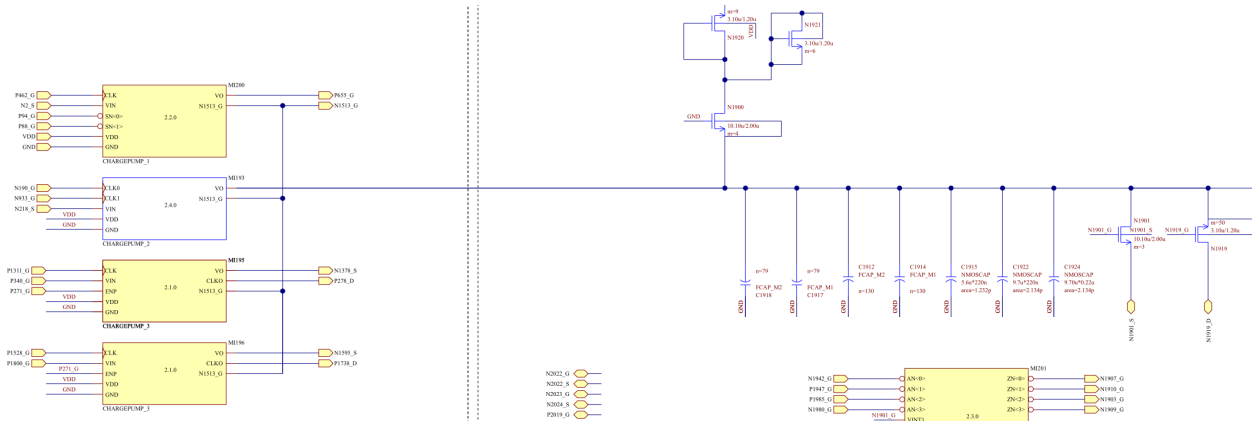
Claim 1	Accused Products
[1pre] 1. A charge pump circuit for generating a charge pump voltage having minimal voltage ripples, comprising:	<p>To the extent the preamble is limiting, each Accused Product includes a charge pump circuit for generating a charge pump voltage having minimal voltage ripples.</p> <p>For example, the Samsung Galaxy S21 Ultra 5G includes the charge pump circuit of the Samsung NAND flash circuit, package marking SEC 110 BOE1 KLUDG4UHDC SD3P300B.</p> <p><i>See, e.g.:</i></p>

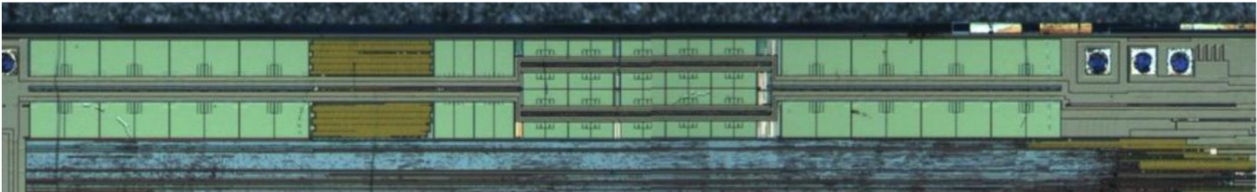
Claim 1	Accused Products
	<div data-bbox="661 305 1535 1161"></div> <p data-bbox="632 1198 1801 1268">Photograph of main system board from Samsung Galaxy S21 Ultra 5G, with NAND circuit indicated</p>

Claim 1	Accused Products
	<div data-bbox="661 284 1543 1063">A detailed photograph of a NAND circuit chip. The chip is dark and rectangular, with several lines of white text printed on it. The text includes a small logo on the left, followed by 'SEC 110 B0E1', 'KLUDG4UHDC', and 'SD3P300B' at the bottom. The chip is mounted on a green circuit board.</div> <p data-bbox="632 1084 1526 1123">Detail photograph of NAND circuit in Samsung Galaxy S21 Ultra 5G</p>

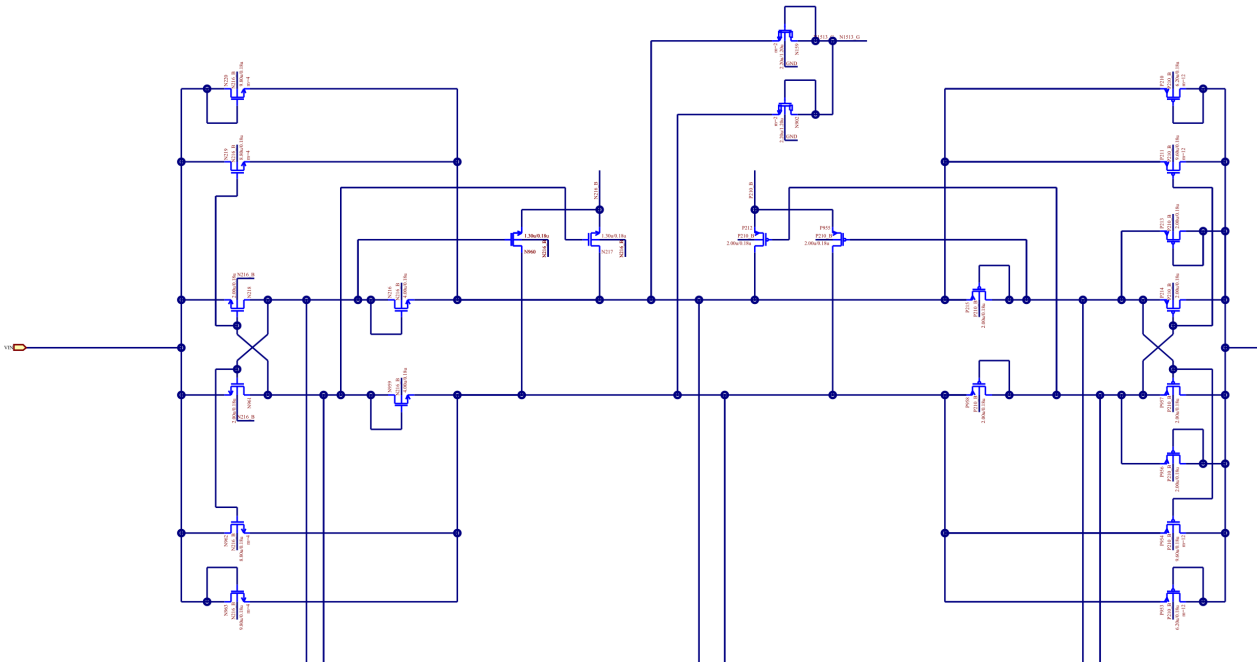


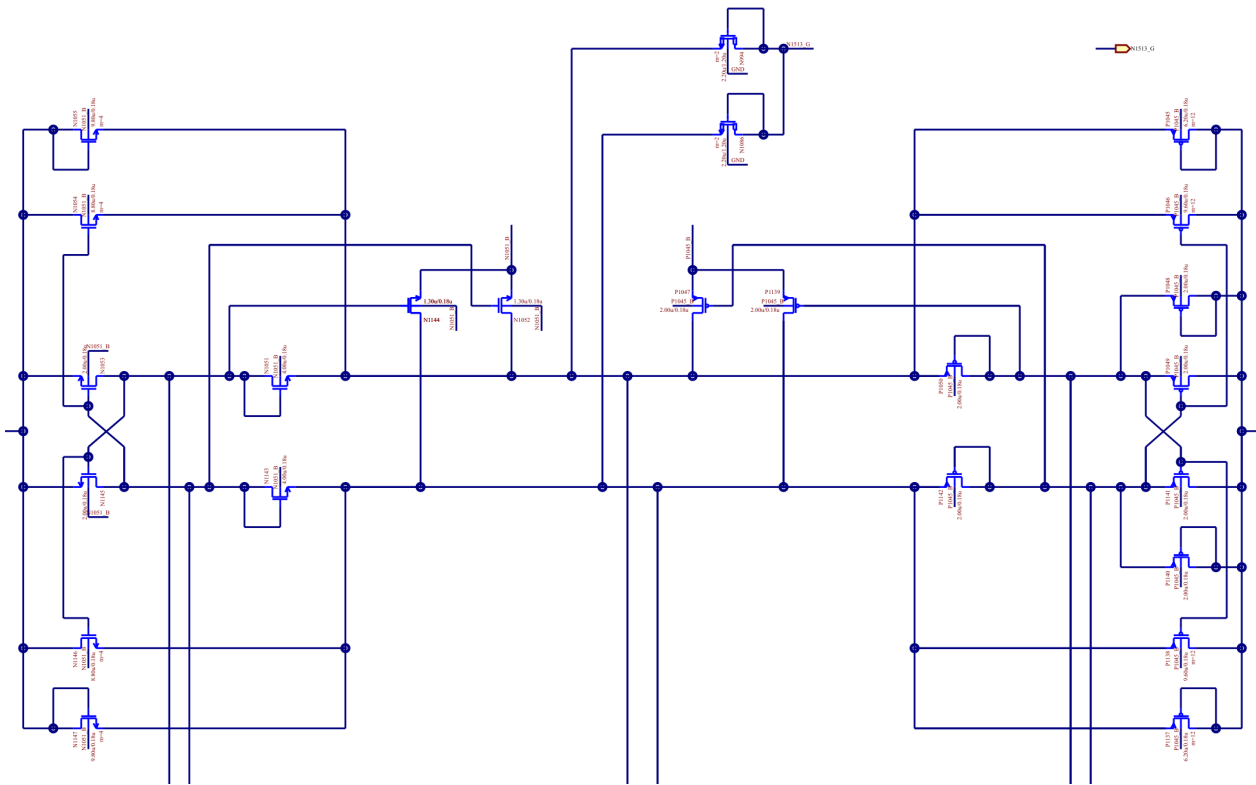
Claim 1	Accused Products
	<div data-bbox="640 264 1885 878"></div> <p data-bbox="640 885 1612 922">Photograph of portion of NAND circuit from Samsung Galaxy S21 Ultra 5G</p> <div data-bbox="636 941 1728 1281"></div> <p data-bbox="636 1307 1612 1344">Photograph of portion of NAND circuit from Samsung Galaxy S21 Ultra 5G</p>

Claim 1	Accused Products
	 <p data-bbox="640 459 1696 495">Detail photograph of portion of NAND circuit from Samsung Galaxy S21 Ultra 5G</p>  <p data-bbox="640 933 1638 966">Schematic of NAND charge pump circuit from Samsung Galaxy S21 Ultra 5G</p>
<p data-bbox="205 995 604 1209">[1a] a pumping circuit comprising one or more stages operable to receive a supply voltage and generate a selected one of a plurality of pump voltages;</p>	<p data-bbox="640 995 1885 1063">Each Accused Product includes a pumping circuit comprising one or more stages operable to receive a supply voltage and generate a selected one of a plurality of pump voltages.</p> <p data-bbox="640 1079 1885 1161">For example, the NAND charge pump circuit of the Samsung Galaxy S21 Ultra 5G comprises the pumping circuit shown below.</p> <p data-bbox="640 1177 751 1209"><i>See, e.g.:</i></p>

Claim 1	Accused Products
	<div data-bbox="640 261 1890 451"></div> <p data-bbox="640 459 1696 495">Detail photograph of portion of NAND circuit from Samsung Galaxy S21 Ultra 5G</p>

Claim 1	Accused Products
	<p>Schematic of charge pump circuit from Samsung Galaxy S21 Ultra 5G</p>

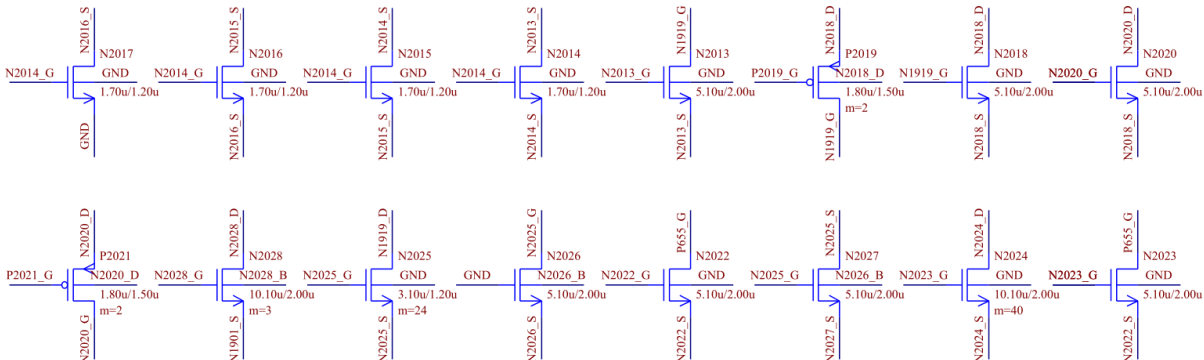
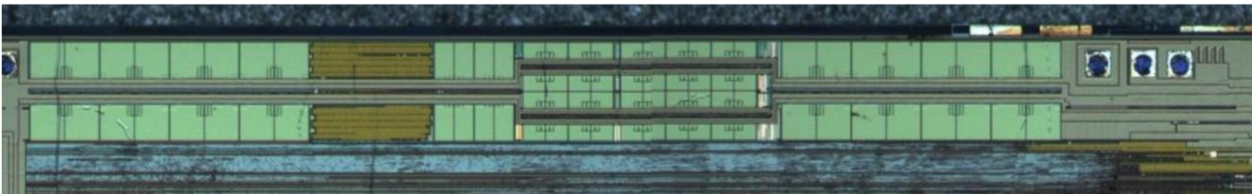
Claim 1	Accused Products
	<div data-bbox="640 267 1890 925">A detailed circuit schematic of a portion of a charge pump circuit, labeled CHARGE PUMP_2. The schematic is drawn in blue lines on a white background. It features a central horizontal bus line. Above this bus, there are several PMOS transistors (labeled P101, P102, P103, P104, P105, P106, P107, P108, P109, P110, P111, P112, P113, P114, P115, P116, P117, P118, P119, P120, P121, P122, P123, P124, P125, P126, P127, P128, P129, P130, P131, P132, P133, P134, P135, P136, P137, P138, P139, P140, P141, P142, P143, P144, P145, P146, P147, P148, P149, P150, P151, P152, P153, P154, P155, P156, P157, P158, P159, P160, P161, P162, P163, P164, P165, P166, P167, P168, P169, P170, P171, P172, P173, P174, P175, P176, P177, P178, P179, P180, P181, P182, P183, P184, P185, P186, P187, P188, P189, P190, P191, P192, P193, P194, P195, P196, P197, P198, P199, P200, P201, P202, P203, P204, P205, P206, P207, P208, P209, P210, P211, P212, P213, P214, P215, P216, P217, P218, P219, P220, P221, P222, P223, P224, P225, P226, P227, P228, P229, P230, P231, P232, P233, P234, P235, P236, P237, P238, P239, P240, P241, P242, P243, P244, P245, P246, P247, P248, P249, P250, P251, P252, P253, P254, P255, P256, 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P921, P922, P923, P924, P925, P926, P927, P928, P929, P930, P931, P932, P933, P934, P935, P936, P937, P938, P939, P940, P941, P942, P943, P944, P945, P946, P947, P948, P949, P950, P951, P952, P953, P954, P955, P956, P957, P958, P959, P960, P961, P962, P963, P964, P965, P966, P967, P968, P969, P970, P971, P972, P973, P974, P975, P976, P977, P978, P979, P980, P981, P982, P983, P984, P985, P986, P987, P988, P989, P990, P991, P992, P993, P994, P995, P996, P997, P998, P999, P1000). The schematic shows a complex network of transistors and interconnecting lines, with a central horizontal bus line. A VDD supply pin is shown on the left. The circuit is organized into several vertical sections, with transistors and lines arranged in a grid-like fashion. The transistors are labeled with their respective IDs and gate voltages. The lines represent the interconnects between the transistors and other components in the circuit.</div> <p data-bbox="630 933 1291 966">Detail schematic of a portion of CHARGE PUMP_2</p>

Claim 1	Accused Products
	 <p data-bbox="630 1047 1890 1120">Detail schematic of a portion of CHARGEUMP_2. The wire at far left connects to the wire at the far right of the previous schematic.</p>
<p data-bbox="199 1144 598 1323">[1b] a plurality of loads selectively coupleable to an output of the pumping circuit, each load associated with a specific pump voltage; and</p>	<p data-bbox="630 1144 1879 1218">Each Accused Product includes a plurality of loads selectively coupleable to an output of the pumping circuit, each load associated with a specific pump voltage.</p> <p data-bbox="630 1234 1879 1347">For example, the output of the pumping circuit is connected to selectable loads as shown below. Due to the different configurations of the selectively coupleable loads, on information and belief each load is associated with a specific pump voltage.</p> <p data-bbox="630 1364 735 1404"><i>See, e.g.:</i></p>

<p>Claim 1</p>	<p>Accused Products</p>
	<div data-bbox="640 259 1887 451"> </div> <div data-bbox="640 461 1887 496"> <p>Detail photograph of portion of NAND circuit from Samsung Galaxy S21 Ultra 5G</p> </div> <div data-bbox="640 506 1887 1133"> </div>

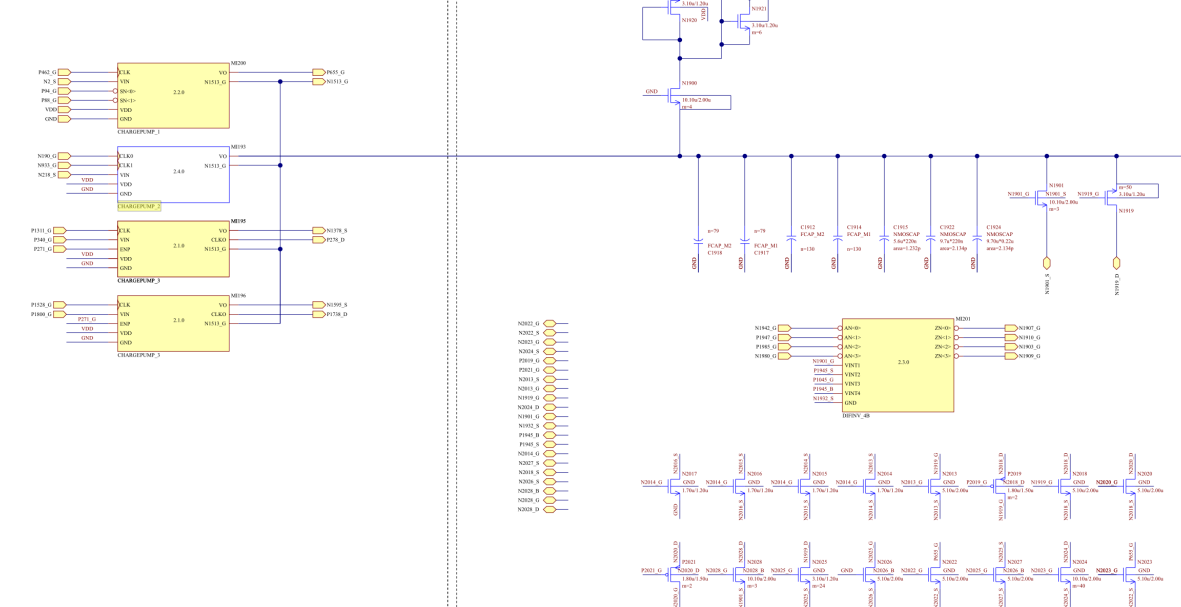
Claim 1	Accused Products
	<p>Detail from schematic of charge pump circuit from Samsung Galaxy S21 Ultra 5G showing loads selectively coupleable to the output of the pumping circuit</p>



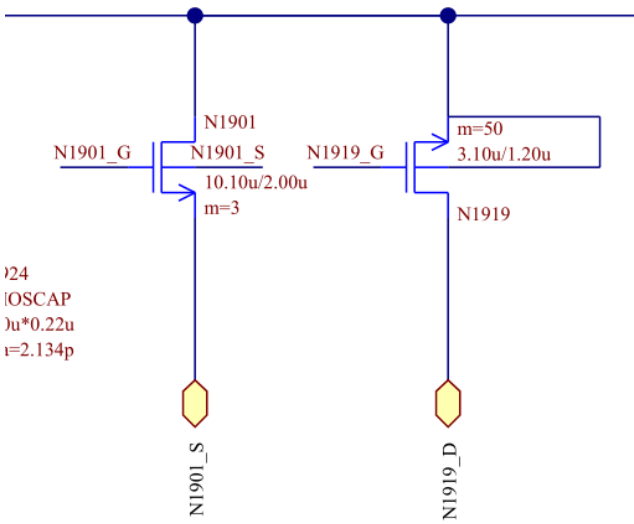
Claim 1	Accused Products
	 <p>Detail from schematic of charge pump circuit from Samsung Galaxy S21 Ultra 5G showing loads selectively coupleable to the output of the pumping circuit</p>
<p>[1c] a load selector means for selectively coupling a load associated with a specific pump voltage to the output of said pumping circuit</p>	<p>Each Accused Product includes a load selector means for selectively coupling a load associated with a specific pump voltage to the output of said pumping circuit.</p> <p><i>See, e.g.:</i></p>  <p>Detail photograph of portion of NAND circuit from Samsung Galaxy S21 Ultra 5G</p>

### Claim 1

### Accused Products



The schematic illustrates a charge pump circuit for a Samsung Galaxy S21 Ultra 5G. It features three main charge pump blocks: ME20, ME21, and ME26. ME20 and ME21 are configured as voltage doubblers, while ME26 is a multi-stage charge pump. The circuit includes various input pins (P101, P102, P103, P104, P105, P106, P107, P108, P109, P110, P111, P112, P113, P114, P115, P116, P117, P118, P119, P120, P121, P122, P123, P124, P125, P126, P127, P128, P129, P130, P131, P132, P133, P134, P135, P136, P137, P138, P139, P140, P141, P142, P143, P144, P145, P146, P147, P148, P149, P150, P151, P152, P153, P154, P155, P156, P157, P158, P159, P160, P161, P162, P163, P164, P165, P166, P167, P168, P169, P170, P171, P172, P173, P174, P175, P176, P177, P178, P179, P180, P181, P182, P183, P184, P185, P186, P187, P188, P189, P190, P191, P192, P193, P194, P195, P196, P197, P198, P199, P200, P201, P202, P203, P204, P205, P206, P207, P208, P209, P210, P211, P212, P213, P214, P215, P216, P217, P218, P219, P220, P221, P222, P223, P224, P225, P226, P227, P228, P229, P230, P231, P232, P233, P234, P235, P236, P237, P238, P239, P240, P241, P242, P243, P244, P245, P246, P247, P248, P249, P250, P251, P252, P253, P254, P255, P256, P257, P258, P259, P260, P261, P262, P263, P264, P265, P266, P267, P268, P269, P270, P271, P272, P273, P274, P275, P276, P277, P278, P279, P280, P281, P282, P283, P284, P285, P286, P287, P288, P289, P290, P291, P292, P293, P294, P295, P296, P297, P298, P299, P300, P301, P302, P303, P304, P305, P306, P307, P308, P309, P310, P311, P312, P313, P314, P315, P316, P317, P318, P319, P320, P321, P322, P323, P324, P325, P326, P327, P328, P329, P330, P331, P332, P333, P334, P335, P336, P337, P338, P339, P340, P341, P342, P343, P344, P345, P346, P347, P348, P349, P350, P351, P352, P353, P354, P355, P356, P357, P358, P359, P360, P361, P362, P363, P364, P365, P366, P367, P368, P369, P370, P371, P372, P373, P374, P375, P376, P377, P378, P379, P380, P381, P382, P383, P384, P385, P386, P387, P388, P389, P390, P391, P392, P393, P394, P395, P396, P397, P398, P399, P400, P401, P402, P403, P404, P405, P406, P407, P408, P409, P410, P411, P412, P413, P414, P415, P416, P417, P418, P419, P420, P421, P422, P423, P424, P425, P426, P427, P428, P429, P430, P431, P432, P433, P434, P435, P436, P437, P438, P439, P440, P441, P442, P443, P444, P445, P446, P447, P448, P449, P450, P451, P452, P453, P454, P455, P456, P457, P458, P459, P460, P461, P462, P463, P464, P465, P466, P467, P468, P469, P470, P471, P472, P473, P474, P475, P476, P477, P478, P479, P480, P481, P482, P483, P484, P485, P486, P487, P488, P489, P490, P491, P492, P493, P494, P495, P496, P497, P498, P499, P500, P501, P502, P503, P504, P505, P506, P507, P508, P509, P510, P511, P512, P513, P514, P515, P516, P517, P518, P519, P520, P521, P522, P523, P524, P525, P526, P527, P528, P529, P530, P531, P532, P533, P534, P535, P536, P537, P538, P539, P540, P541, P542, P543, P544, P545, P546, P547, P548, P549, P550, P551, P552, P553, P554, P555, P556, P557, P558, P559, P560, P561, P562, P563, P564, P565, P566, P567, P568, P569, P570, P571, P572, P573, P574, P575, P576, P577, P578, P579, P580, P581, P582, P583, P584, P585, P586, P587, P588, P589, P590, P591, P592, P593, P594, P595, P596, P597, P598, P599, P600, P601, P602, P603, P604, P605, P606, P607, P608, P609, P610, P611, P612, P613, P614, P615, P616, P617, P618, P619, P620, P621, P622, P623, P624, P625, P626, P627, P628, P629, P630, P631, P632, P633, P634, P635, P636, P637, P638, P639, P640, P641, P642, P643, P644, P645, P646, P647, P648, P649, P650, P651, P652, P653, P654, P655, P656, P657, P658, P659, P660, P661, P662, P663, P664, P665, P666, P667, P668, P669, P670, P671, P672, P673, P674, P675, P676, P677, P678, P679, P680, P681, P682, P683, P684, P685, P686, P687, P688, P689, P690, P691, P692, P693, P694, P695, P696, P697, P698, P699, P700, P701, P702, P703, P704, P705, P706, P707, P708, P709, P710, P711, P712, P713, P714, P715, P716, P717, P718, P719, P720, P721, P722, P723, P724, P725, P726, P727, P728, P729, P730, P731, P732, P733, P734, P735, P736, P737, P738, P739, P740, P741, P742, P743, P744, P745, P746, P747, P748, P749, P750, P751, P752, P753, P754, P755, P756, P757, P758, P759, P760, P761, P762, P763, P764, P765, P766, P767, P768, P769, P770, P771, P772, P773, P774, P775, P776, P777, P778, P779, P780, P781, P782, P783, P784, P785, P786, P787, P788, P789, P790, P791, P792, P793, P794, P795, P796, P797, P798, P799, P800, P801, P802, P803, P804, P805, P806, P807, P808, P809, P810, P811, P812, P813, P814, P815, P816, P817, P818, P819, P820, P821, P822, P823, P824, P825, P826, P827, P828, P829, P830, P831, P832, P833, P834, P835, P836, P837, P838, P839, P840, P841, P842, P843, P844, P845, P846, P847, P848, P849, P850, P851, P852, P853, P854, P855, P856, P857, P858, P859, P860, P861, P862, P863, P864, P865, P866, P867, P868, P869, P870, P871, P872, P873, P874, P875, P876, P877, P878, P879, P880, P881, P882, P883, P884, P885, P886, P887, P888, P889, P890, P891, P892, P89

Claim 1	Accused Products
	 <p>Detail from schematic of charge pump circuit from Samsung Galaxy S21 Ultra 5G showing loads selectively coupleable to the output of the pumping circuit</p>

**Claim 2**

Claim 2	Accused Products
<p>2. The charge pump circuit of claim 1, wherein the load selector means includes a target output pump selector for shutting down the variable charge pump circuit when the target output pump voltage</p>	<p>To the extent the preamble is limiting, each Accused Product includes the charge pump circuit of claim 1, wherein the load selector means includes a target output pump selector for shutting down the variable charge pump circuit when the target output pump voltage (<math>V_{cfrac}</math>) is greater than or equal to a reference voltage (<math>V_{ref}</math>).</p> <p><i>See evidence and explanation for claim element [1a], supra.</i></p>

Claim 2	Accused Products
(Vcfra) is greater than or equal to a reference voltage (Vref).	

**Claim 3**

Claim 3	Accused Products
3. The charge pump circuit of claim 2, wherein the load selector means further includes a maximum ripple on the target output selector means for adding a load, whenever a maximum ripple on the target output voltage (Vcfrb) greater than the reference voltage (Vref) then the maximum ripple on the target output selector means adds additional loads until the Vcfrb voltage is less than or equal to the reference voltage (Vref).	<p>To the extent the preamble is limiting, each Accused Product includes the charge pump circuit of claim 2, wherein the load selector means further includes a maximum ripple on the target output selector means for adding a load, and whenever a maximum ripple on the target output voltage (Vcfrb) greater than the reference voltage (Vref) then the maximum ripple on the target output selector means adds additional loads until the Vcfrb voltage is less than or equal to the reference voltage (Vref).</p> <p><i>See evidence and explanation for claim element [1a] and claim 2, supra.</i></p>

**Claim 6**

Claim 6	Accused Products
6. The charge pump circuit of claim 1, wherein the load selector means is a plurality of switches, one switch for each of said loads, each switch having a first terminal, a	To the extent the preamble is limiting, each Accused Product includes the charge pump circuit of claim 1, wherein the load selector means is a plurality of switches, one switch for each of said loads, each switch having a first terminal, a second terminal, and an enable terminal, the switch being coupled in series with each load, the first terminal of the switch being coupled to the output pump and the second terminal of the switch is coupled to each load.

Claim 6	Accused Products
second terminal, and an enable terminal, the switch being coupled in series with each load, the first terminal of the switch being coupled to the output pump and the second terminal of the switch is coupled to each load.	<i>See evidence and explanation for claim element [1c] supra.</i>

**Claim 7**

Claim 7	Accused Products
7. The charge pump circuit of claim 1, wherein each load selector means comprises an NMOS transistor having a gate, a drain and a source, the gate of the NMOS load transistor being coupled to an enable signal, the source of the load NMOS load transistor being coupled to an electrical ground, and the drain being coupled to a load.	<p>To the extent the preamble is limiting, each Accused Product includes the charge pump circuit of claim 1, wherein each load selector means comprises an NMOS transistor having a gate, a drain and a source, the gate of the NMOS load transistor being coupled to an enable signal, the source of the load NMOS load transistor being coupled to an electrical ground, and the drain being coupled to a load.</p> <p><i>See evidence and explanation for claim element [1c] supra.</i></p>

**Claim 8**

Claim 8	Accused Products
8. The charge pump circuit of claim 7, wherein each load is a capacitor or a current sinker	To the extent the preamble is limiting, each Accused Product includes the charge pump circuit of claim 7, wherein each load is a capacitor or a current sinker having a first terminal and a second

Claim 8	Accused Products
having a first terminal and a second terminal, the first terminal being coupled to the pump voltage and the second terminal being coupled to the drain of the NMOS transistor.	terminal, the first terminal being coupled to the pump voltage and the second terminal being coupled to the drain of the NMOS transistor.  <i>See evidence and explanation for claim element [1c] supra.</i>